

# YLEM JOURNAL

Artists Working With Science and Technology

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## PIONEERS OF NEW MEDIA

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# EDITORIAL

## PIONEERS OF NEW MEDIA

--Loren Means

This issue of the YLEM Journal presents the first of a series of interviews with and articles by artists who have helped to define our conceptions of art that is made with the help, collaboration, and creativity of computers. Over the past fifty-some years, the computer has gone from an expensive and scarce entity to an all-pervasive and dominant element of our lives. The creation of art using computers is consequently accessible to more artists than before, although it remains a fairly specialized field. The first artists to wrangle with this tool needed to call on unbounded creativity and invention to make even the most rudimentary attempts at art, and in the process they dealt with issues and improvised solutions that need to be acknowledged and preserved.

One of the first organizations to draw widespread attention to computer art was Experiments in Art and Technology, popularly known as EAT, founded in 1967. Directed by Billy Kluver, EAT was predicated on the concept that programming computers was too complicated for artists, and so had to be accomplished by engineers. Kluver saw his goal as bringing together artists and engineers in symbiotic relationships that would result in the creation of collaborative works of art. Enlisting the participation of Robert Rauschenberg, EAT staged a series of events in New York City that were fraught with technical mishaps, but well-publicized.

Ken Knowlton was recruited into this collaborative environment as an engineer. A crack programmer with Bell Labs, Ken worked on computer graphics images and films. As Michael Rush put it in *New Media in Late 20<sup>th</sup>-Century Art* (1999): "Experimental filmmaker Stan Vanderbeek and artist Lillian Schwartz worked [at Bell Labs] with engineer Kenneth Knowlton, producing what are now considered seminal works of computer art. Vanderbeek's 1965 *Poem Fields*, a rapid-fire film of digitally generated abstract images, and Schwartz's 1970 film *Pixillation*, also composed of programmed abstract images, are two examples." Ken ultimately grew frustrated with this situation, and eventually discovered that the concepts of programming and artistic creation were not mutually exclusive, and began producing significant art on his own. Ken has been written about in such books as *Disappearing Through the Skylight* by O. B. Hardison, Jr. (1989), *Experimental Cinema* by David Curtis (1971), *Virtual Reality* by Howard Rinegold (1991), and *Expanded Cinema* by Gene Youngblood (1970). I became acquainted with Ken by email when I pointed out that a casino in South America had erected a statue of Einstein facing it, since Einstein had remarked to Niels Bohr regarding quantum theory that "the old one does not play dice with the universe", so that now Einstein could watch people playing dice into eternity. Ken sent me this email: "Apropos of your comment on Einstein and dice [YLEM Journal Vol 23, # 6]: I too have played dice with Einstein -- see my portrait of him, made of 999 black dice, at the website [www.KnowltonMosaics.com](http://www.KnowltonMosaics.com)."

Herbert Franke is a German physicist who began exploring computer graphics in the 1950s initially working with oscilloscopes. A true Renaissance man, Herbert is also a science fiction writer (I'm currently reading his novel *The Orchid Cage* from 1961), an explorer, and an expert on things Chinese. He lectured on cybernetic aesthetics and computer art at the University in Munich. An emphasis in Herbert's early explorations of computer graphics was the metamorphosis of imagery, both in terms of modulation of still imagery and in terms of flow from one version of an image to another. Herbert is the author of the important history, *Computer Graphics—Computer Art* (1971), which he sent me when I told him that the copy at the San Francisco Public Library had been stolen. He also contributed historical surveys from 1979 and 1986 to *Ars Electronica: Facing the Future* edited by Timothy Druckrey (1999). I contacted Herbert by email in response to an article of his in a recent *Leonardo*. Oliver Frommel is a webmaster who participated in the Make-World Festival in Munich, Germany, in October, 2001. This interview with Herbert Franke originally appeared at <http://www.kein.org/makeworld/>.

Lynn Hershman Leeson has been working with computers in a variety of media for over thirty years. She is best known for work in performance, photography, video, and movies. She is credited with creating the first interactive laserdisc artwork, *Lornna* (1979–1983). Lynn is a professor of Electronic Art at the University of California, Davis. In 1995 she received the Siemens/ZKM Media Arts Award, and was called "the most influential female artist of new media." She edited *Clicking In: Hot Links to a Digital Culture* (including a CD-Rom) in 1996. Her films, *Conceiving Ada* (1996) and *Teknolust* (2002), blazed trails in digital filmmaking. As she puts it in her many presentations, she made *Teknolust* as a pretext to create a web site featuring the intelligent head of one of the film's characters, Ruby. Ruby answers questions from audiences in a profound and hilarious manner. I met Lynn at a lecture she gave at the San Francisco Art Institute, and have since seen her presentations at Dorkbot and Alive@9<sup>th</sup> Street. I interviewed Lynn at her studio South of Market Street in San Francisco, surrounded by art objects like her "Water Woman" series of photographs, her AK-47 media environment, and, of course, Ruby.

Late breaking news: I ran into Lynn at Shirley Shor's opening at Paule Anglim's Gallery in San Francisco, and Lynn told me that she had been relieved of her teaching duties at UC Davis because one student had complained about Lynn's screening of John Cassavetes' film *Shadows* and Martin Scorsese's *Mean Streets* in her experimental art class. She was very concerned about what she sees as a wave of censorship in this country.

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**Cover Image:** *Water Woman Series*, Lynn Hershman Leeson, 1974 - various sizes.

"The water woman series, done in various media from collage to digital prints, has been a recurring theme, underscoring our human origins, the idea of disappearance, our connection to electricity for light, and ultimately, the fragile nature of life itself."

## "The Heartfelt Search"

Tuesday, Jan. 18, 7:30 pm, McBean Theater, Exploratorium, 3501 Lyon St., San Francisco, CA 94123

FREE, Open to the public and wheelchair accessible.

Reaching for the stars and deep into the human psyche, four artists, a composer and a poet, share their visions, using multimedia art, photography, poetry and painting. Featured are Betty Roszak, Jim Gasperini, Dana Lynn Andersen and Cindy Pavlinac, plus Diane Fenster and her colleague Michael McNabb.

### PROGRAM:

Poet Betty Roszak of Berkeley California, reads her poem about the supernova of 1987 with a backdrop of striking visuals. With Theodore Roszak, she edited *Masculine/Feminine: Readings in Sexual Mythology and the Liberation of Women*. Her audio-texts "Starbirth" and "The Crest of the East Pacific Rise," poetic evocations of recent scientific discoveries, have been presented to numerous audiences, including the American Association for the Advancement of Science and the Geophysical Union of America.

Multimedia artist and writer Jim Gasperini has worked in various media over the years. He has produced interactive multimedia works on CD-ROM, written books for children, designed thoughtful computer games, and created interactive works for the web. He is a recipient of a fellowship from the New York State Council for the Arts. Another aspect of his work that he will present is stereo art - on the web using his own technique. <http://www.well.com/user/jimg/>

Painter Dana Lynne Andersen, founder of Awakening Arts Institute, is a multi-modality artist, writer and teacher. Her Awakening Arts Institute is a world-wide network of artists, patrons and friends who believe that art has the power to transform consciousness. She is the illustrator of *Born with a Bang; the Universe Tells our Cosmic Story* (Winner of the prestigious Teacher's Choice Award) and *From Lava to Life; the Universe Tells our Earth Story*. <http://www.awakeningarts.com/>

Cindy Pavlinac endeavors to capture the beauty and mystery and power of place in her photographs. She works on location throughout Europe and North America photographing ancient sanctuaries and modern expressions of the sacred. Archaeo-astronomy has been the subject of much of her travels since 1984. Her website is at [www.sacred-land-photography.com](http://www.sacred-land-photography.com).

Photographer and digital artist Diane Fenster in 1989 began to exploit the new Photoshop software for multilayered, narrative imagery. In 2001, she was the first artist to be inducted into the newly formed Photoshop Hall of Fame sponsored by the National Association of Photoshop Professionals and Adobe Systems. She and her sound artist collaborator, Michael McNabb, will present *Secrets of the Magdalen Laundries*, a room size installation that creates a symbolic laundry environment by combining large scale photographic images printed on cotton bedsheets hung from clothesline, with a 12 channel digital sound composition based on the recording of women speaking Irish Gaelic.

# ANNOUNCEMENTS

Julie Newdoll will have the following exhibits:

The Woodside Library show is March 22 - April 30, and the opening reception is on Saturday, April 2, from 2:00 - 4:00, at 3140 Woodside Road, Woodside CA 94062

My Place at the Table - Rose Shenson Gallery, Triton Museum of Art, 1505 Warburton Ave, Santa Clara. April 16 - May 14, 2005 Reception Sunday, April 17, 2005, 1-3 p.m.

Henry Warwick and Loren Means played Music at the New Nothing Film Theatre, in conjunction with films and other musicians, including Doug Katelas and Henry Kuntz.

Henry Warwick will be performing on April 29, at CSU Long Beach, as part of the soundCommons Orchestra.

# Herbert Franke: Expert in Computer Art, Cybernetic Aesthetics, Speleology ...

QUESTIONS by OLIVER FROMMEL

OF: Your biography is quite colorful. How did this come about?

HF: There are reasons for this. In fact I wanted to work in science. But I studied just after the war, and when I graduated there was no chance of doing anything in this profession. Since I had already been writing and had started experimenting with photography as a student, I had additional possibilities, and I saw that people who are sitting there in the hierarchy, in some bureaucracy, are really poor people. At first I thought this applied only to civil servants, but then I found out that the same applies to industry officials, and my last discovery in this context was that even university officials are no better. Even if you only consider what I have done on the side in terms of scientific work, I've done more than many a professor who gets paid for his research, because he has to deal with organizing seminars or raising funds. I didn't have to do all that.

OF: What is the background of your artistic work?

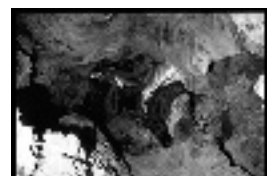
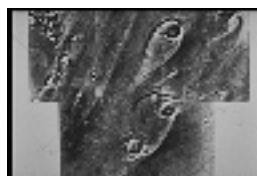
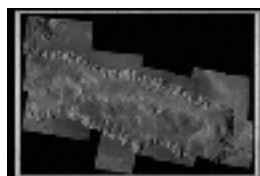
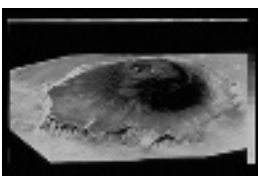
HF: I am trained to be a physicist, and therefore I was not restricted by this art context, in which you had to go by some rules imposed by that context. Anyway, one did not get invited into any gallery, and there were no prizes. That meant one could do what one pleases. There, completely independently of the contemporary fashion at that, in which the artist is still quite trapped in tradition, one could really work freely. That went on for ten years, until the historians, the art theorists began to show an interest. I remember how, at the Ars Electronica, we worked undisturbed for about ten years, and no one from the academies showed any interest. Then suddenly it became famous, it became a success, and everybody came and said things like "I don't understand, I'm an arts professor in Linz, why am I not invited?" As things go in Austria, the guy then got an invitation, and that meant a step backwards. We then had such people on the jury, and I remember how one of the most famous Austrian artists, who had to be on the jury because he had demanded it, said to the others: "What nonsense it is, this electronic art, that stuff they do." And then at the award ceremony he was holding great speeches again. In my own works and in those of the people I was in close contact with (these were Frieder Nake and Georg Nees and later also Manfred Mohr and a few others), we were faced with the problem that people did not really understand us. In a way it was clear to us from the very beginning that the real strength of the computer does not lie in creating still pictures, that it hides incredibly interesting possibilities and one really has to follow that way. People then did not understand in what way our thinking

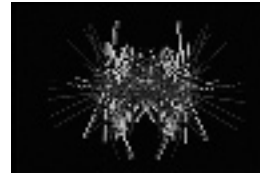
differs from that of others, and even today there are only few who do.

OF: And what is your purpose?

HF: Even today, when I am invited somewhere, they keep asking me for pictures. Now an exhibition is planned in the German Museum, and what they wanted from me are examples of picture processing on portraits. And one of the earliest examples of picture processing ever, I have made with the help of a setup developed by the department of electro-medicine of Siemens at Erlangen, with which I did a series of pictures. I scanned a b/w photo of Einstein, which I then gradually processed and so gradually alienated. The idea was that with an optical setup for dissolving, one could create a small series in which Einstein could first be seen as real and then become ever more abstract, until nothing but a vague smear remained. Then I produced slides by holding the camera in front of the screen, at the time there was no other way to do it. And of course some art critic then said: "What's that now again? Some game? It doesn't make sense." Then I said: "You apparently just have not understood the sense." Then he: "But why, why?" And I: "Well you surely know what Einstein has done. When he started working, our world was still concrete, and at the end of his work, the world had become abstract. All this I express with the example of Einstein's picture. And if you want things more concrete, then you can say that the head is visible at first as a face, and what then happens with my series of alienations is that you end up seeing only the outline of the brain."

This was only an example showing that there was a transition to the movement there. We always thought that the way of working the computer gives us the possibility, if we describe the images through mathematical formulae, to vary the parameters, and that in arbitrarily small steps. And if you do that, you have the raw material for an animation series. In principle this was possible even then, however costly, and the realization as a film was even more expensive. At the time there was no money in that. People nowadays do not understand this, they'll ask you: "Why did you not have a large image made?" To which I say: "Well, don't you know what an Ektachrome of that size costs?" We took a cheap copy in order to have a picture for documentation purposes, but in reality what mattered to us was not the picture, but the series of movements, and in this respect the slides are much closer to the original than the enlargements we are making, which they now want to hang there at all costs. And that's how they do it at the German Museum as well. They were not even prepared to install a dissolving setup, they just hang two pictures on the wall, and that's it.





OF: What was the development in the technical equipment you have been working with? Are there differences between analog and digital systems?

HF: The final aim in our work was of course always to get soft transitions, at first in the colors, later in the movement. Remarkably these wishes could be fulfilled by the cathode ray oscillographs. It was all soft and completely smooth and with no jerks in the movement. It's just that with the cathode ray oscillograph of course you cannot, and by far, do as much as with a digital system. That's why we were convinced that a point would be reached, sooner or later, in the development of computers, at which this wish would be fulfilled. Of course this was not possible with the plotter, when you have to transfer each picture in a 20 minute ceremony on cardboard - you need to be able to generate images on the monitor lightning fast. Then, with the electronic method, it worked. After all, the plotter is an archaic system in comparison with the electronic systems we compute the images with.

OF: Besides your artistic work you have always also worked on a theoretical level on art, and have written a number of books about this. What is the relation between your practical and theoretical work?

HF: In a way I've always been more interested in abstract images than in alienated real pictures, because they raise a problem with art theory. It is understandable that people are interested in depiction. But at the time, the question of why people are interested in completely abstract images was unsolved in my eyes. The art theorists at the time were saying that there was no such thing, that each abstract image contains something concrete hidden in it, and that this is what makes an impression. I did not believe this, and indeed it isn't so. For me the experiments with these things were also activities of an experimental aesthetics. My idea was that one should not tackle art from a historical point of view, but rather analyze it scientifically and ask oneself what concrete statements can be made. Of course you will hit a limit at some point, but I thought there must be some way. It's only somewhat later that it became clear how this could be done, namely through information theory, in which one can clearly see that art is a communication process. The relevant theory is thus communication theory, and as a mathematical instrument information theory. This in turn is linked to perception, since our brain, which perceives, is a data treatment system, an analytic system, a system for interpreting. This leads you directly in the full range of problems of neurology and brain research, but there's no way around it if you want an explanation for the phenomenon "art".

OF: And where does technology come into play?

HF: Creativity can be expressed in technology, why is it expressed also in art? Is it the same, or a different creativity? We are here at a really deep point at which both have their root, if we say that the man is a tool maker. If man at a given stage has recognized these skills as useful and has developed them through a process of selection, there are reasons for this. Then again, he has not made these tools for the fun of it, they had to be useful to him. Then we reach the point where he starts developing art machines as well. Suddenly we have both. The one who develops the art machine, perhaps a program, I'd include that into the concept of the machine, at once also wants to work with it. And it's extremely interesting to see that in the first five years there were no artists involved, because they simply did not know how to program, did not know math and simply did not have access to computers. There were, incredibly, many programmers and mathematicians who had felt the challenge of these systems and had started to make more or less interesting things, without there being any reason for it, without having been told to do it. In the US there was a magazine called *Computers & Automation*, and that's when the stroke of luck hit. The editor-in-chief's girl-friend was an art professor, and they put out a contest in 1963. They wanted to award prizes for the most beautiful computer graphics and thought the odd image would be sent in. They ended up receiving buckets full of contributions, from all over the world.

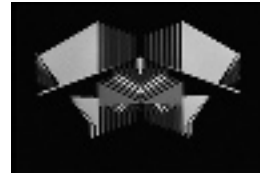
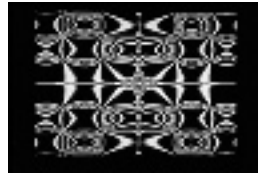
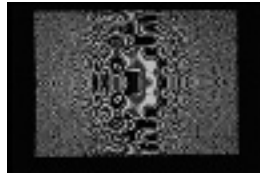
OF: To what extent has technology influenced your way of working?

HF: Nowadays, when you program graphics, you usually don't have control over the sequence in which you apply the elements. At the time this was not necessary, you could use a completely different method, which I've used again and again. When you have applied the elements, and an element called up later comes to lie on an element called up earlier, the latter was hidden behind the former. I could thus apply a loop of arbitrarily many elements, and the image would continuously change. If I built in a random generator that would define the image parameters, I would get perpetual sequences of moving images. I've done this quite often, with all sorts of thoughts on the back of my mind...

OF: Has the interaction with the viewer played an important role for you?

HF: The idea of taking art down from its high pedestal and making it tangible and susceptible to manipulation was there from the beginning. And if I may allow myself to hyperbolize, in this way the vision or wish that every one of us may be an artist is a bit easier to attain. Because one spares oneself practicing manual skills and can thus concentrate much more on





the conception process. I think this is a good thing. In the plastic arts this may not be quite so obvious, but when I observe the poor music students, it was not about music at all, the aim is exclusively to be able to move one's fingers a bit faster. I really ask myself, where is there art in all this? And when you can spare yourself that, then you reach realms in which people do not have a clue, simply because they have not learned it. I, for instance, am very fond of jazz, and am interested also in harmonic sequences that differ from those of our music. When I try to speak with such a person about it, they have no clue. But that is the interesting and essential thing, all that concerns composition, the structure of this music. This means that with our technological resources we make the way free for dealing only with the actual, creative process. So that one is not excluded because one's hands are too slow, or because one is clumsy with the paintbrush. The intellectual faculty is not tied by the inabilities that we, unfortunately, have here and there.

OF: Has the further development of technology changed also art itself, or the approach to it?

HF: This has changed to the extent that now also from among artists there is a rather great interest for the media. In the transition period in which the first artists came and said: "What do I have to do if I want to use this instrument?" One would then say: "Well, my dear, you need to learn how to program." "Oh, my God." So there was this wish coming from artists to be able to use these systems as easily as possible, and the consequence of this were the pen systems. This means that today we have, besides the method of describing the image with a formula, a second method, which is to simulate the classic art process with a pen system. On the other hand, a completely new method of description - namely programs - provide a kind of notation, a partition for images. This notation however by far surpasses the musical notation, because the generative principle is contained in the programs - which is not the case of musical notation. This means one can see the structuring principle in this program, which carries in itself this concrete art work that has been programmed. Naturally this allows changing things at the root and also making something entirely new. While the person writing something with an inductive pen on a tablet will likely produce no more than someone would have produced with a graphite pen in earlier times.

OF: Do you consider the development of technology is progress?

HF: I need to relativize this a bit. Today one can use pen systems. Quite refined tools are available on the market for reproduction, for fanning out, for modifications of the image structure, all this can, nowadays, be called

up and inserted even without knowing math. Today there is such a broad range of pen systems and programs available that offer such effects, that even I don't sit down and invent a new structure there, except if I have an idea I want to realize and don't find anywhere. Then I need to sit down, but I can do it. Nowadays one can find many very interesting possibilities. I must say that today one can really work creatively with pen systems. But I nevertheless think that if you work on a deeper level where you really have to think about the structure you are initiating and introducing into the image, then you go a bit below the surface. If you work with a pen system, on the other hand, you remain on the surface. These are the fundamental possibilities acquired through the stimulation that comes from this way of working with programs or on a mathematical basis.

OF: Do you see an end to this technological development? In what direction are things likely to go?

HF: I could imagine that with the appearance of three-dimensional screens, i.e., output devices in which you really see in three dimensions and also create in three dimensions, one will need completely different pen systems. And they are not appropriate for these devices anyway, those are then architectural systems if we deal with buildings. One could also use genetic programs to grow graceful things. I think that we have great possibilities ahead of us. But here we have already drifted off somewhat into tangential topics. We do not need to worry about specific fundamental mathematical things, but have to get to know principles of growth, possibilities for structuring, for instance in the organic world. Think of Prusinkiewicz who was probably the first to try to simulate processes of growth. Carls Sims then took this up, this is still avant-garde, I would say, but in a few years it will be available to all, of course, and if you imagine in addition three-dimensional creation, then you can imagine all sorts of things. I imagine for instance myself sitting in a small planetarium, just the size of an igloo, but if good use is made of the means of representation I don't see the border and see arbitrarily far into space. I'm surrounded by the screen, just like in the CAVE system, but without the edges, I can walk through it, and I can, at the same time, intervene creatively, like a gardener who says: "Here I want to plant," or like an architect who says: "Here I want to build a building." You could create entire planetary systems, there are still enormous possibilities there, but this is just one sector. The other will probably melt together with such things. Because these are not entirely unproblematic any longer. Even when you work with such a simple system as Bryce, you will realize that you are given choices in terms of optical devices to the extent that they do not know any longer what they are actually doing, if they haven't worked with quantum physics.





OF: Which two types of artistic activity you described above do you see as the most valuable?

HF: I think that one has to respect both nowadays, also as a creative activity. Someone can make use of the work done by his or her predecessors, and nowadays one cannot do without it. If you use a programming language there are many ideas included in it, which you just draw on. But of course also in a more concrete sense, when you use pen systems the possibilities integrated in them are of such a great variety that nobody has been able to oversee them completely. This means that you are faced with a set of instruments that allows you to create innovation, something completely new that nobody before you has made. This is a very nice system and in every way acceptable. But after all, the interesting thing about computer and media art is that it has not reached its maturity yet. There are enormous possibilities that one will be able to tackle only when the systems reach that stage of development. This is the unique chance we have, to be living in these times. Someone who has carved stone with a chisel may not have this chance any more. In the domain of stones there will not be much to be found that would open new possibilities from the side of the raw material, these are exhausted. But we work with immature systems. This often annoys us, because we'd like to do something and know that in principle it can be done, but we don't have the instrument yet, we cannot pay for it, or even if we could pay for it, it does not exist yet, because we would need a quantum computer and so on. This is a wonderful, but also frustrating thing. It is in this interstice that we are active.

OF: Are you an expert?

HF: Everyone is an expert, on what they are interested in and what concerns them. In this sense I am also an expert. But of course I am especially an expert on the things I have explored intensively, perhaps more than others. That is for instance this development over the first years. It is unlikely that there are many who have followed this as I have. After all at the time I was already freelancing and was able to do more or less what I found interesting. Almost all my colleagues, Hacke, Nees or Noll and all the others had a permanent job of some kind and could not do what I did, which is to remain systematically up to date about what is going on. And of course I could participate in many discussions, I wrote a few books, which again led to new contacts. This has allowed me to get to know many people, to travel, so that in this domain I am of course an expert. In this domain there are many questions that have been explored very intensively, but often these are tiny details. For instance, over the past two years I have worked on making animations with the programming system Mathematica.

Then I simply compiled a book from my own experience, and so I could say that I am an expert in animations with the Mathematica system. But if someone comes along and asks me how to solve differential equations with the system, I have to say, "for God's sake, don't ask me, I have no idea." Although the system is quite useable, Mathematica is strangely structured, and you have to be something like a Chinese calligrapher, of which they say there are only five who really know all the signs, and all the others just use a few of them and make do with those. Those, however, who know them all, don't get anything else done, because they continuously have to be up front to keep themselves up to date or to complement. So I am no expert for Mathematica, but just for a tiny subspace of it. And in many other domains it is the same, one can say there is a strange lack of knowledge in the vicinity of expert knowledge.

OF: You are in a sense an expert in familiarizing yourself with the greatest variety of domains?

HF: I could also say that I am an expert on the overarching relations between different branches of science, on the overview that arises. I have noticed this in many discussions. When you discuss art, then you enter many different domains, after all I don't know in advance what I will be asked in such a discussion. One person wants to know about the color structure of a given image, created with a given computer program, the other asks me whether there is something divine to be found in oil paintings. I have noticed with many people who are indeed experts in arts or cybernetics, that they are splendid in their domain and know everything. But it's not enough to take into account only one thing. Another also has its influence, and then suddenly they have reached their limits. And I am in the comfortable position to be able to link many things with each other. I have been forced to work quite intensively with information theory, which is mathematically quite demanding, with the theory of automata, cellular automata, then of course programming, what is behind it, what are their fundamental possibilities. But in the first few years I have also worked on building computers out of the smallest electronic parts. In my work I have also been a writer and have worked on science fiction, or have come across physical problems of speleology. Before starting to write science fiction I had to collect precise information and see whether I can present things this way and I think I have made few mistakes. This overview is there, but of course you cannot demand the detail from me.



# PORTRAIT OF THE ARTIST AS A YOUNG SCIENTIST

(c) 2005 Ken Knowlton

*If you don't know where you're going, you will surely end up somewhere else.*

Yogi Berra

*To be sure of hitting the target, shoot first, and call whatever you hit the target.*

Ashleigh Brilliant

*Basic research is what I'm doing when I don't know what I am doing.*

Werner von Braun

*One never goes so far as when one doesn't know where one is going.*

Goethe

Through today's lens -- near-future and pragmatic -- it was a place of misty legend: that brick and mortar fortress on a hill in the Northeast Kingdom of New Jersey. Quiet and apparently innocuous. But stealthy, to those who read its press releases as warnings of upheaval down the road. To most folks, its announcements -- about atoms, plasmas, phonons, and such figments of science -- were of little relevance to their composure or bottom lines.

Bell Telephone Laboratories, as my colleagues and I experienced it during the 1960s and 1970s, was a beehive of scientific and technological scurrying. Practitioners within, tethered on long leashes if at all, were earnestly seeking enigmatic solutions to arcane puzzles. What happened there would have baffled millions of telephone subscribers who, knowingly or not, agreeably or not, supported the quiet circus.

For people who believe in science, and who still believe in technology, it was

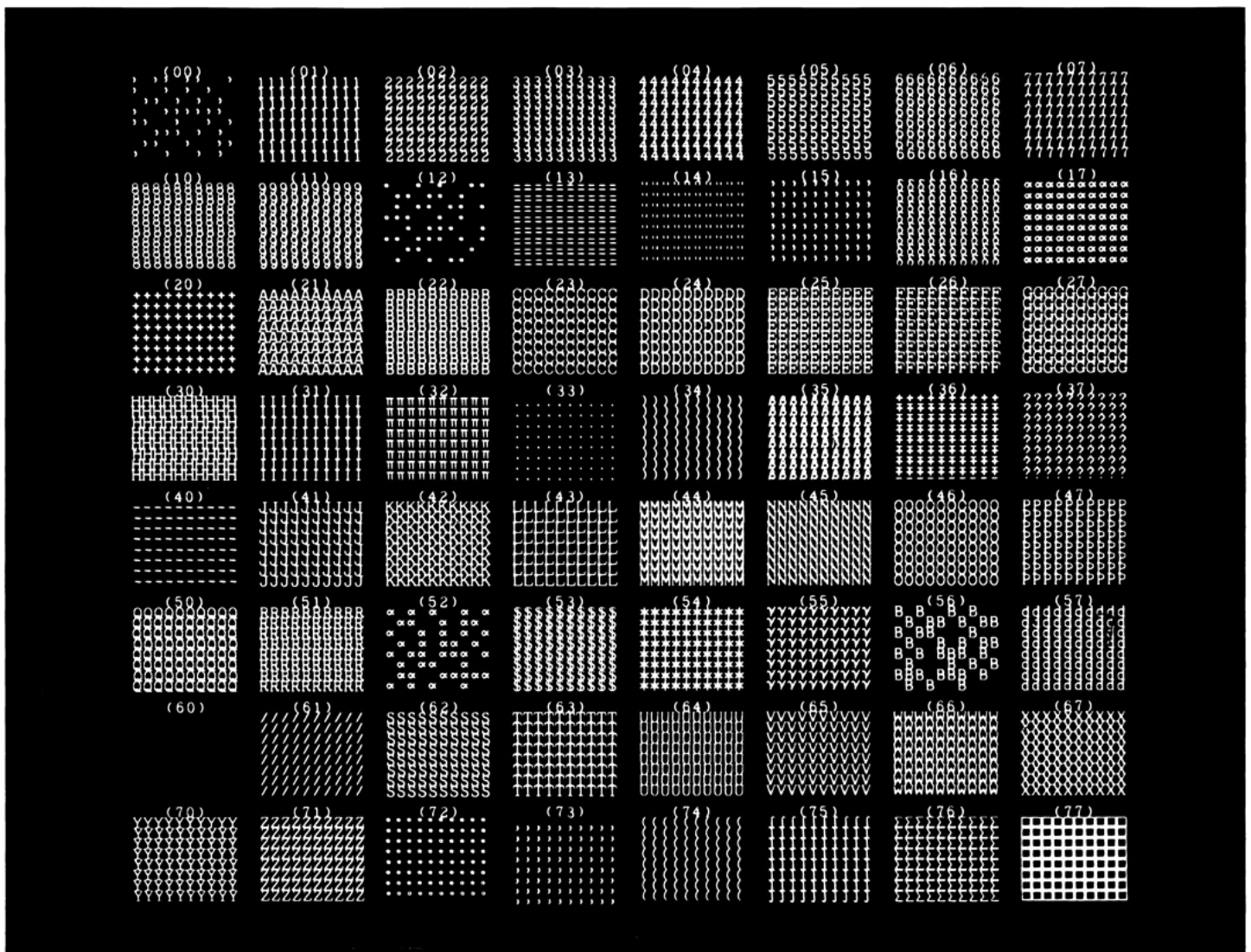


Figure 1— Swatches filled with various letters to achieve different levels of gray (including randomly textured areas), and early example of raster scan (bitmap, or pixel) graphics. Produced on a Stromberg Carlson 4020 Microfilm Printer, 1963.



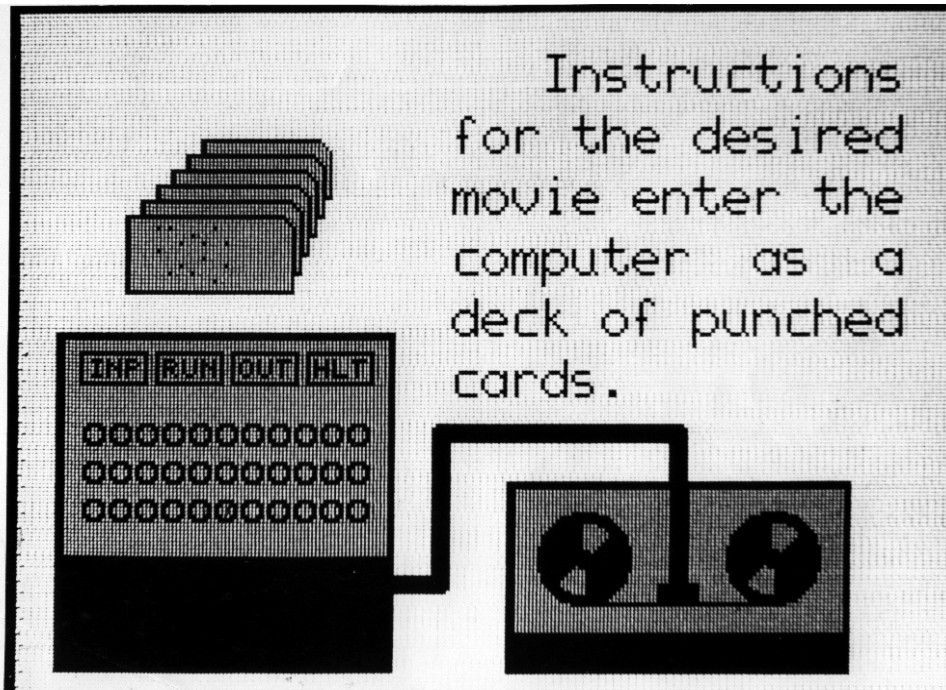


Figure 2— Frame from the film *A Computer Technique for the Production of Animated Movies*, B/W, 16mm, silent, 10 min. 1963. Produced by programming in the "BEFLIX" language, run on an IBM 7094 computer, output via a Stromberg Carlson 4020 microfilm printer, describing the author's BEFLIX language for raster-scan (bitmap) graphic output.

the epitome of free exploration into how the world did, or could, work. For those concerned with tangible results, the verdict, albeit delayed, is indisputable: fiber optics, the transistor, Echo and Telstar, radio astronomy including confirmation of the Big Bang. Advances in metallurgy, computational methods, and all manner of information storage, transmission and processing. Bell Labs truly was a national resource, and for anyone who was there or who cared, its decline is one of the great tragedies of the past half century. You may be familiar with the names of people I knew there: Claude Shannon, John Pierce, William Baker, and a dozen Nobel laureates, McCarthur Fellowship "geniuses" and other notables. Like Richard Hamming who, soon after I arrived from MIT in 1962, advised me to "slow down -- if everyone here made more than one contribution to the Bell System in his lifetime, the System would be in chaos." At first startled, I did accept this as an excuse not to obsess over telephones.

My main interest was computers, particularly their use in picture-making. The Labs had a new microfilm printer that exposed letters and vectors on 35 mm film. Some of my friends -- Mike Noll, Ed Zajac and Frank Sinden -- were soon making simple movies (with terrible vertical jitter because the camera lacked filmgate registration pins). My own shtick became a sort of greyscale picture made by filling the screen with thousands of different letters chosen for their brightness. I soon wrote a memo to department head Tom Crowley, suggesting the possibility of a "computer language" for making animated movies; his two-part response launched my career in raster graphics: "It sounds rather ambitious, but why don't you see what you can do?"

Within a year, I had a set of subroutines dubbed BEFLIX, an acronym for "Bell Flicks," arguably the first computer language specifically for movie making. (I have also been called the inventor of the pixel, which is a bit of a reach, though I might claim independent discovery.) I used BEFLIX, of course, to make a movie about the process by which it was made. With no sound track, was unbearably dreary and highly schematic.

But this, in 1964, was a first of sorts, and Bell Labs arranged a press conference for fellow movie makers and me to crow

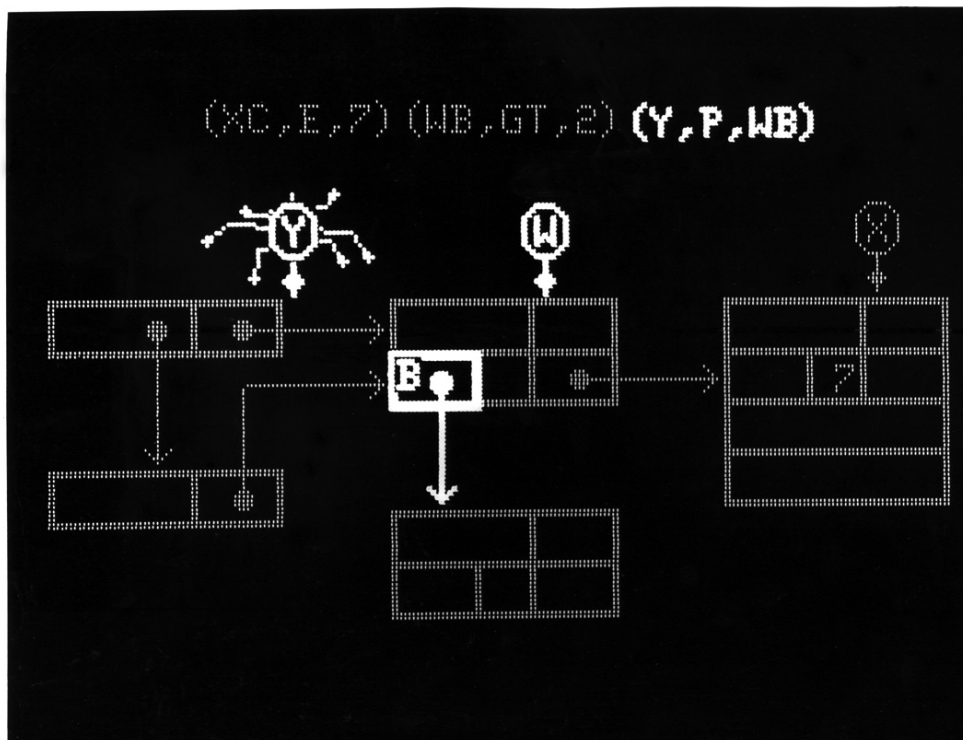
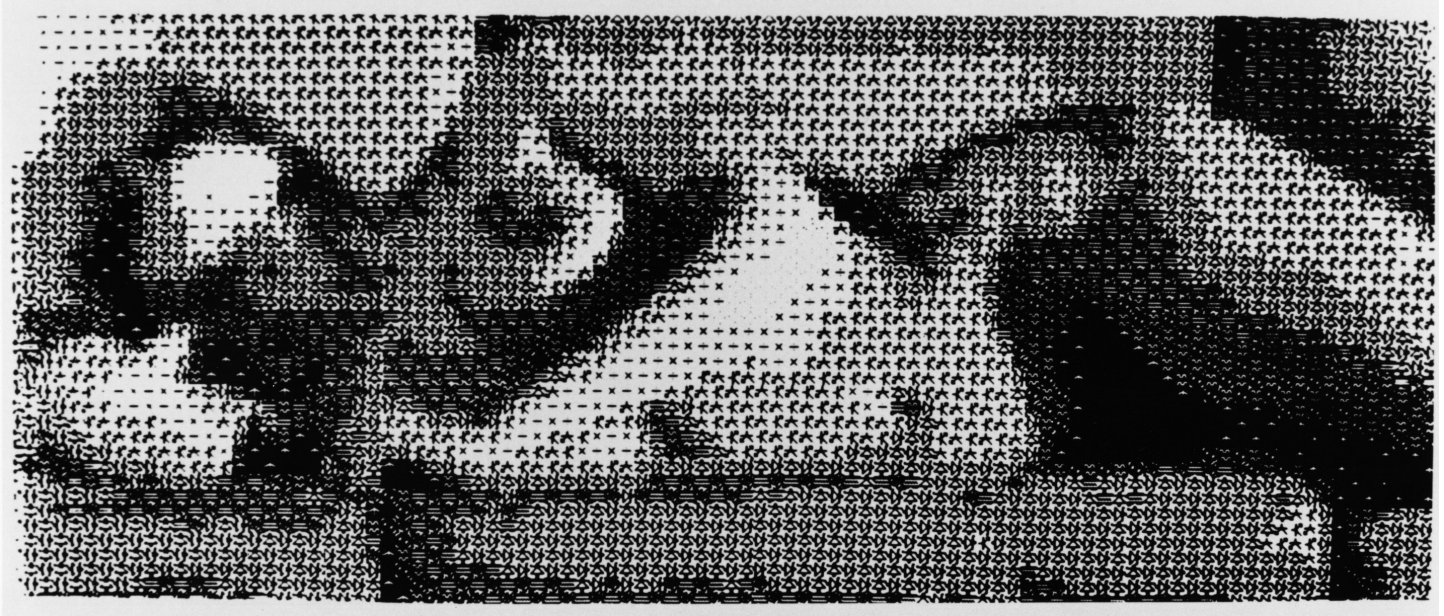


Figure 3— Frame from film *L-6: BELL LABORATORIES' LOW LEVEL LINKED LIST LANGUAGE, Part I*, (introduction to the author's list-programming language L-6), 16 mm, B/W, 16 min, sound, 1966. Animated, articulated "bugs" serve as base pointers, crawling about and pointing to various blocks of computer storage.



[Figure 4— The Harmon-Knowlton Nude, 5' x 12': Made by "flying-spot" scan of a photograph, a program in BEFLIX run on an IBM 7094, output in eight sections via a S-C 4020 printer, photo printed, abutted, rephotographed and enlarged. The image consists of electronic symbols which in turn are composed of 11 x 11 arrays of the characters alpha and blank.]

about our accomplishments. I remember in particular one reporter who badgered me about the possibility of someday resurrecting Rock Hudson and Doris Day, by computer, to star in posthumous movies. I argued that nothing like that would ever happen: it was too complicated, and certainly not worth the effort; computers were for serious scientific movies, for example about atoms, whose cavorting could be scripted by vectors and equations. Unswayed, his newspaper story about computer animation featured Rock Hudson and Doris Day. (As we all now know, the obstreperous reporter's imagination was right on target.)

The BEFLIX language did serve, non-reflexively, a couple years later for a set of films that I made about my list-processing language L-6 (the Laboratories' Low-Level Linked List Language); it contained an early case of articulated animation in which insect-like base pointers crawled about in the computer, pointing to blocks of memory.

The nonscientific, some say artistic, aspects of computer graphics arose for me via a sophomoric prank. Ed David, two levels up, was away for while and the mice, one might say, played ever more freely. Leon Harmon stopped by to ask me for help with a brilliant idea: when Ed returns, one entire wall of his office will be covered with a huge picture made of small electronic symbols for transistors, resistors and such. But overall, they will form a somewhat-hard-to-see picture of, guess what, a nude! And so the renowned Harmon-Knowlton nude was conceived, coaxed into being, and duly hung on Ed's wall.

Ed was delighted but worried. More viewers than we had expected were apparently familiar with the subject matter, and could "see" the 12-foot-wide picture from as many feet away. It was therefore judged an unseemly decoration for the Labs, especially midway up the hierarchy. After just one day of glory there, she was retired to Ed's basement rec-room. Smaller versions of the big picture mysteriously did propagate (we had not the slightest idea how); the PR department scowled and warned that "you may circulate this thing, but be sure that you do NOT associate the name of Bell Labs with it."

But the big version burst forth a while later at a press conference on Art and Technology in Robert Rauschenberg's loft, and on the watershed date of October 11, 1967, it appeared atop the first page of the second section of the New York Times, which made not the slightest effort to conceal its birthplace. Billy Kluver claims that this was the first time ever that the Times printed a nude! The PR department huddled and decided, so it seems, that since she had appeared in the venerable Times, our nude was not frivolous in-your-face pornography after all, but in-your-face Art. Their revised statement was: You may indeed distribute and display it, but be sure that you let people know that it was produced at Bell Telephone Laboratories, Inc.

We did make similar pictures -- of a gargoyle, of seagulls, of people sitting at computers -- which have appeared here and there. But it was our Nude who would dolphin again and again into public view in dozens of books and magazines. Sometimes it is excused by a more dignified title, like *Studies in Perception I*; once the two of us were photographed in front of it, providing a scant two-piece cloak of modesty. Just recently I encountered it in Lewis Mumford's *The Myth of the Machine* (1970) where, as last in a three-panel display, it demonstrates progress (or regress) in mechanization of the portrayal of woman.

That was the beginning for me of a fascination with large pictures made of small things that has occupied my eyes, hands and mind ever since. It was also my first conscious buffeting by chaos: a mischievous butterfly had flapped, and a huge chunk of my career and persona veered onto a new course.

On the other hand, and again by chance, my debut as artist was postponed for several years. How so? Because Art-and-Technology was the rage, and The Museum of Modern Art had a "Machine Show," and the Brooklyn Museum and other places had similar parties, and in each case Leon and I submitted the Nude to demonstrate a collaboration between artist and techno-geek (or whatever). One of us had to be an artist. So by the whim of a spin-launched coin, Leon became the artist and I remained a technologist (pretense aside, so did he). I did not understand until

ten years later that I had lost the toss, since artists, I was learning, were the perceptive predictors, the daring, flamboyant and revered analysts of past, present and future, the grand but sly commentators on human joy and sorrow. (After another ten years, and exposure to a hundred artists, I learned that that notion was 90 percent humbug.)

Other breeds than scientists crept into the Laboratories, especially at night and on weekends. Encouraged especially by Max Mathews and Billy Kluver, they were musicians and artists seeking access to big machines and to people who knew how to use them. I was one of the native knew-hows, and thus became the engineer/scientist/programmer/technologist of a series of art-technology collaborations.

We were all trying, exploring and enjoying things made possible by new hardware and software. Few of us were aware that we were making History -- a misfortune for historians because both stories and artifacts, who knows how many, have slid into oblivion. I think, for example, of my worst seashell portrait, so washed-out in appearance that it served only as my entry in a "Vague Art" show in Phoenix AZ; I later flung it, face-down, two-arm Frisbee style, into a New Hampshire landfill (where it may possibly survive intact longest of all).

I slowly lost my sense of awe at artists. Art, ten or a hundred years after the fact, can be inspiring, admirable and mysterious. But few artists are more stunningly awe-inspiring than, say, gardeners or woodworkers or masons. Or than children. With the perceived barrier lowered, I decided that although I was still a communications scientist, I was also an artist -- mostly at home, pattering away, taking pictures apart and putting them back together in idiosyncratic ways, and keeping a low profile. I had already had my fifteen minutes on stage.

Most of my work concerns people's faces -- an unendingly rich subject area, as is well demonstrated, for example, by Terry Landau's entertaining book *About Faces*. An in-your-face face is hard to ignore. It is also a good proving ground if the visage well-known.

You may, quite rightly, have serious skepticism about the use of computers for art -- how much humanity can be expressed by the use of such an unwieldy machine? Perhaps, paraphrasing Abraham Kaplan, you may say that, because I have a hammer, everywhere I look I see things that need pounding. Well, ah, yes.

I do look here and there and see existing or potential images that do need my kind of pounding. And I think that some of the results might be worth keeping. That's how I see the results my artistic endeavors so far -- a thrust into several new possibilities for picture-making, including serious first tries at artwork of intrigue and substance.

Perhaps my artworks are esoteric: art about art. But quietly so -- they are non-assaultive; you have to invite and process, them. The main questions here, old as art itself, are: Can these images help you to experience in a new way the things, people and pursuits alluded to? Why do you see what you think you see, and more than is in fact really there? How is it that crude or oddly structured pictures can be more evocative than scrupulously detailed, explicit ones?

KCK Parsippany NJ October 2004



See examples of Knowlton's artwork at [www.KnowltonMosaics.com](http://www.KnowltonMosaics.com)

# Interview with Lynn Hershman Leeson



Tecknolust (2002)

--Loren Means

LM: The first work you did, did you initially start out as a performance artist?

LHL: Oh, no. I started out as a painter. Then it moved to dimensional painting, then sculpture, then environments, then sculpture that talked, with audio tapes, then performance, then interactive, then film and video.

LM: So you've constantly moved through media. What makes you move from one medium to another?

LHL: Well, one thing leads to another. They're just different questions about the same thing. It's not that your context shifts, it's just that you want to find a different way to say something.

LM: How long has Paule Anglim been your gallery representative?

LHL: Since 1975. Thirty years. They have the Water Woman series and a lot of photographs. They showed the stock ticker for Synthia and sold it there.

LM: I want to ask you about your upcoming book. Is it a monograph?

LHL: Yes. It will be titled *The Art and Films of Lynn Hershman Leeson: Secret Agents, Private I*, from University of California Press. There are articles by Robin Held, Howard N. Fox, Amelia Jones, Glenn Kurtz, Abigail Solomon-Godeau, Jean Gagnon, David E. James, B. Ruby Rich, Marsha Kinder, Steve Dietz, and Meredith Tromble. They'll talk about the film, they'll talk about the photography, they'll talk about the interactive works. A lot of people think that it's done by different people. They know my film but they don't know the art, or they know the photographs and they don't know the sculpture. This kind of puts it all together. It comes out about a year from now. It's ready, but they're waiting for the retrospective show of my work at the Henry Museum of Art in Seattle.

LM: Meredith Tromble is the editor?

LHL: Yes. And it will have a DVD, that Kyle Stephan is working on, included.

LM: Could you talk about your latest projects?

LHL: Just in the past couple of years, I'm working on Agent Ruby, DiNA, and Synthia. All of my works have female characters in them. Agent Ruby is an artificial intelligent Web agent that you can talk to, and has real-time animation, so she speaks with her mouth moving and has expressions as she talks. She's connected to the Internet, so she has infinite knowledge. You can talk to her about anything. Synthia is a piece that is tied to the Internet too, but it reads the stock market. The character Synthia has behavioral changes based on the Dow, the Russell, the NASDAQ, and the S&P, so that for every two percent change in the Market, she has a different behavior that she exhibits. DiNA is the character that's going to run for President. She's a virtual character that uses Ruby's brain, but she'll be installed in a voting booth, so you'll be able to do electronic voting on various issues with her.

LM: You've quoted Marshall McLuhan, talking about various media, how they are influenced by each other, and how old media and new media are influenced by each other.

LHL: It's just that people are always one step behind what's really happening. Movies came out of plays, and the Internet-based things are the next evolution of film. People use the last medium in order to describe what the new medium is, it seems.

LM: It seems to me that in *Teknolust* you were using the film medium to talk about computer-based people that don't exist, and you were simulating them using the medium of film. So basically you're telling a story about something that hasn't come into being yet.

LHL: Except that we used a 24-frame high-definition camera, and we made virtual people. So a lot of what you see doesn't exist—the fact that it's only one actress, not four—being implanted into this.

LM: You called the characters SRAs...

LHL: Self-Replicating Automaton. They can replicate themselves, and they're independent.

LM: But did they replicate themselves, or were they all replications of Rosetta?

LHL: Originally she made them, but then they became autonomous. That's when they got into trouble.

LM: And at the end, Ruby replicates by getting pregnant, which is not self-replicating, it's the regular way of replicating.

LHL: She is a hybrid, and her child will be a hybrid, part human, part machine, the way Ruby is, in a sense.

LM: It seems like Rosetta looks into the computer and sees the SRAs in there...

LHL: She talks to them through the microwave, but they live downstairs in the basement.

LM: So they're really cyborgs. It seems to me that when alien life forms get postulated, they're really alternative humans.

LHL: That's all the information they have, is what's human. But Olive makes a comment about them being better than humans, because humans have so many problems.

LM: Greg Bear talks about evolution being intelligent and manifesting itself around us right now in ways we're not aware of.

LHL: It's ubiquitous in information systems, things that you don't necessarily see. I agree with that.

LM: And a scientist named Nick Herbert says that quantum mechanics is intelligent.

LHL: I worked with Nick in 1976. We made a piece for Bonwit Teller windows. We reconstructed the windows. He did this thing about time and laser images that showed up in the sunlight.

LM: So you've been on the leading edge of media for thirty-five years.

LHL: Well, I've never been doing what anybody else does, at the time I'm doing it. They do it later, but not at the same time.

LM: It sounds like you're always an outsider.

LHL: A witness.

LM: But people are also witnessing what you're doing, because you're leading.

LHL: But they don't witness it usually until later. They usually think I'm crazy when I do things. It takes a while.

LM: And yet you've managed to keep going.

LHL: I take jobs, I teach, I use my own money. I don't always get funding for things.

LM: That's a perpetual problem, right? That new technology tends to belong to big corporations.

LHL: Unless you get a trade. Like I got this Veeper system. They let me use that. Sometimes people let you actually do it. It's the system of animation that makes Ruby talk. I paid a thousand dollars for it, which is nothing. And it's a sixty thousand dollar program

LM: And that's been the evolution of technology, that eventually it gets rolled out so that artists can afford to use it...

LHL: Or find a way to use it. I think also, being female makes it difficult. I'm

always the only female that's ever gotten anything. I think that people look askance at females. It becomes problematic.

LM: So Ruby at agentruby.com is the most advanced AI there is?

LHL: Done by an artist. I don't even think done by an artist. Done period. That anybody's done.

LM: And what's advanced about it is that it's got so much knowledge.

LHL: Not just knowledge, but that she is animated, and she talks, and she has emotions. Just the degree of development that she has. The programmers that gave us the software go all over the world and look at this stuff, and they haven't seen anything like this. But again, people don't know what to do with it. They don't know how to judge it. They'll look at pre-programmed modules and think that's AI, rather than what this is. They just don't understand how hard it is to do, or what actually it is, which is problematical.

LM: So this is the ultimate Expert System. But that's not what you intended it for?

LHL: No, I just wanted to make a smart person.

LM: And now you're working on voice activation...

LHL: She speaks. But we will do a version where you can just talk to her. Ask Ruby a question.

LM: [Typing] Where is Swansea?

Ruby: Where the heart is. Where can I find a boyfriend?

LM: So ultimately your goal is to create a being that goes out into the world, and that takes evolution to another level?

LHL: I think we're working towards that anyway. That life is. That we're symbiotic with machines right now.

LM: It seems to me that there's an optimism in your current work that wasn't there previously.

LHL: Howard Fox says that same thing, as a matter of fact. A kind of redemption. Maybe it's maturity. You see things at a different level and you're not so angry. You have more distance from being immediately immersed in something, and take it to another level. If you're not optimistic, and you don't have faith in the future, faith in people, where are you? You go to nihilism, this emptiness.

LM: It seems to me that your earlier work was deconstructive in a negative way, and there's more to it now.

LHL: I think it's at a different level. Pointing out the critique or the discrepancies isn't enough. Just like doing work isn't enough. You have to get it seen, you have to get it collected, you have to get it into another voice, where it's accessible. So just talking about mediation and manipulation, assimilation, doesn't quite cut, it, because you have to ultimately have a

destiny, or a belief in the future. I think that's what drives everything that we do, everything that lives.

LM: There has to be desire, in order to do things, and there has to be pleasure...

LHL: or belief, a belief system. And a philosophy that goes beyond just doing it. There's something that lives beyond you, and has some resonance of a core to it, rather than a surface.

LM: Do you think that the different media that you have worked in have led you in a particular direction?

LHL: I think they're all the same. When you look at Roberta, who is this virtual person, to Ruby, they're all dealing with the same issues, how media affects who we are. All of the pieces are really about that.

LM: I notice a visual lushness in your films, especially in *Conceiving Ada*. Do you think this comes out of the film medium itself?

LHL: I think it's because I come out of the visual arts language, and I just love that kind of installation. I like special effects, and whenever I get a chance to use them, I do. These kinds of alpha channels that I used as a positive force in *Conceiving Ada* are always there, but I think that other people who are film people don't see it as much as somebody who's been dealing only with surface images. Seeing what's actually there and using it, rather than always manufacturing it. I do think that film is extremely complicated. Not making the film, but getting the financing, getting distribution, is very difficult. But these other works are very difficult too, and complicated. They just reach different audiences.

LM: When you start making feature films, your work is viewed and criticized by a different audience than when you create art pieces.

LHL: I had a show with Ruby and Synthia and *Teknolust*, and there were reviews about all of them the same day in different sections. Nobody knew it was the same person.

LM: I noticed that sometimes *Conceiving Ada* was reviewed by art critics. It seemed that the film critics who liked your films got the details wrong, and the critics who understood the films didn't like them.

LHL: It's not anything that falls into traditional categories, so they're not

prepared to talk about it. I think if people liked it, they generally were over the top in praise, or if they didn't like it, they hated it. There wasn't any kind of middle ground. I think part of the problem is that it's not anything that you learn in film school, because I didn't go to film school. So a lot of them don't know what to do with something like this.

LM: I'm fond of *Solaris* by Lem. I like the concept of an alien consciousness that is really alien. I like to speculate how a non-human consciousness would manifest itself.

LHL: Through the network. Through ubiquitous embedded chips. Things that react but maybe don't have a presence. Intelligence.

LM: In one of your articles, you say "According to Freud, reality may be limited to perceptions that can be verified through words or visual codes. Therefore, perceptions are the drive to action that influences if not controls

real events. Perceptions, therefore, become the key to reality." Could you elaborate on that?

LHL: Well, basically, it's that we create what's real. The inauthentic is often more authentic, if we perceive it to be. In fact, Rechiko, this woman from Japan who writes about this stuff, was saying that in Japan humans were imitating machines. So that, in that case, the virtual machines that the humans were imitating were the origins for reality. So it's all a matter of perception of what becomes real.



Teknolust (2002)

LM: You said in your commentary on the DVD of *Teknolust* that virtual reality will become more real than real reality.

LHL: Yeah, I think one of the characters did say that. But also, the camera had that essence of being more real than real, in the way it picked up colors. Things that are more vivid, kind of a second dimension of what's there. A deepened perception.

LM: I made a film where I was spinning sculpture around and moving the camera radically, and when I projected the film there were all sorts of shapes and images...

LHL: that you don't see. They were there, but you just couldn't see them. That's why you never know what you'll get when you make something until you really study it frame by frame, because there are all kinds of things that are embedded, that are invisible. Which again is an intelligence that's existing in the world that we're not able to see, unless we use some other kind of tool.

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# YLEM

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## JOURNAL

*n. pronounced ey lum, 1. Greek: for the exploding mass from which the universe emerged - the material of the universe prior to creation.*

YLEM is an international organization of artists, scientists, authors, curators, educators, and art enthusiasts who explore the Intersection of the Arts and Sciences. Science and technology are driving forces in the contemporary culture and YLEM members strive to bring the humanizing and unifying forces of art to this arena. YLEM members work in contemporary media such as Computer Based Art, Kinetic Sculpture, Interactive Multimedia, Robotics, 3-D Media, Film, and Video.

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